A NEW CRUSTACEAN, DIAPTOMUS VIRGINIENSIS, AND A DESCRIPTION OF DIAPTOMUS TYRELLI POPPE.

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The species of *Diaptomus* in the United States are pretty well known, inasmuch as collections have been made and examined from practically all sections of the country. Any material addition to the number is not to be expected; hence considerable interest attaches to anything that is distinctly new. Because, too, the species of *Diaptomus* are so distinct, and in many cases have such a definite geographical distribution, it is especially important that the species diagnoses should be as exact as possible. For these reasons it seems wise to record the description of a new species recently found in Virginia, and to publish the modifications of the diagnosis of *D. tyrelli* which result from the study of specimens from new localities.

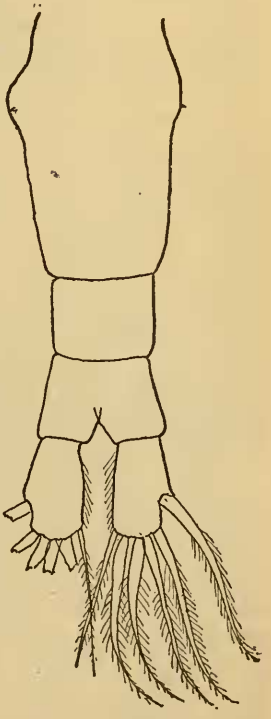

Fig. 2.—Diaptomus virginiensis. Abdomen of female, × 445.

DIAPTOMUS VIRGINIENSIS, new species.

Of moderate size. The first cephalothoracic segment is somewhat longer than the three following. The third and fourth are much shorter than the second. The last cephalothoracic segment is somewhat produced laterally, and terminates on each side in a rather acute point. About midway on the posterior border of each lateral lobe is a minute spine (fig. 1). The general form of the cephalothorax is slender, the anterior part narrow and almost pointed.

Fig. 1.—Diaptomus virginiensis. Lateral wing last Cephalothoracic segment, × 445.

The first segment of the female abdomen (fig. 2) equals in length the rest of the abdomen, including the furcal rami; it is rather slender,

dilated in front and laterally, the lateral dilatations not very prominent, with two minute lateral spines at about one-third its length. The second and third segments are about equal in length, and the furcal rami are somewhat longer than these segments, and are ciliate on the inner margins.

FIG. 3.—DIAPTOMUS VIRGINIENSIS. TERMINAL SEGMENTS OF ANTENNA OF MALE, × 445.

The antennae are 25-segmented and extend beyond the furca.

The right antenna of the male is much swollen anterior to the geniculating joint. The antepenultimate segment (fig. 3) bears a very short hook-shaped process.

The first basal segments of the female fifth feet (fig. 4) are armed with rather small spines. The lateral hairs of the second basal segments are rather long and slender. The exopodite consists of two segments. The hook of the second segment is stout and denticulate on the inner margin. The outer angle of the second segment bears two spines, the inner unusually long, being about twice the length of the outer. The endopodite is 1-segmented, and is somewhat longer than the first segment of the exopodite. It is setose on the inner margin of the tip, and the tip is armed with two rather stout spines.

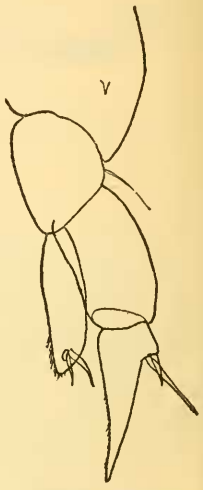

FIG. 4.—DIAPTOMUS VIRGINIENSIS. FIFTH FOOT OF FEMALE, × 875.

The spines of the first basal segments of the male fifth (fig. 5) feet are of moderate size. The second basal segment of the right foot is rather elongate, its distal end twice as wide as its proximal. The inner margin is convex, the outer straight, making a rather sharp bend near its distal end. The lateral hair is situated at about three-fourths its length. The first segment of the exopodite is about as broad as long, its inner and outer margins convex, and bears a triangular hyaline projection on its inner margin, which is continued as a shelflike projection on its posterior surface. The second segment is approximately four times as long as broad, concave on the inner margin and convex on the outer. The lateral spine is stout, about one-third the length of the segment, and situated about midway of its

FIG. 5.—DIAPTOMUS VIRGINIENSIS. FIFTH FOOT OF MALE, × 445.

length. The terminal hook is much shorter than the second segment of the exopodite, is stout, and symmetrically sickle shaped. It is denticulate on its inner margin. The right endopodite is 1-segmented, triangular in shape, and about equal in length to the first segment of the exopodite. The left foot, in length, nearly reaches the end of the first segment of the exopodite of the right foot. The second basal segment is about as broad as long, the inner margin being somewhat longer than the outer. The lateral hair is near the distal angle. The first segment of the exopodite is longer than wide, the distal end being about half as wide as the proximal. The second segment of the exopodite is slender and bears on about half its inner margin a setose pad. It is terminated by a digitiform process, on the inner margin of which is a falciform, clawlike spine.

Length of female exclusive of furcal setae, 1.366 mm.

Length of male exclusive of furcal setae, 1.24 mm.

This species was found in material collected by Mr. H. K. Harring in Black Pond, Virginia.

It seems to be most nearly related to *D. birgei*.

Type-specimen.—Male Cat. No. 47892, U.S.N.M.

Paratypes, one female Cat. No. 47897, U.S.N.M., and one slide males and females, 9 specimens. Cat. No. 47893, U.S.N.M.

DIAPTOMUS TYRELLI Poppe.

1888. *Diaptomus tyrelli* Poppe, p. 150.
1889. *Diaptomus tyrelli* De Guerne and Richard, p. 39, pl. 1, figs. 17–18; pl. 4, fig. 26.
1895. *Diaptomus tyrelli* Herrick and Turner, p. 76, pl. 10, fig. 19.
1897. *Diaptomus tyrelli* Schacht, p. 176.
1907. *Diaptomus tyrelli* Marsh, p. 441, pl. 19, figs. 2, 3, and 8.
1915. *Diaptomus pribilofensis*, Juday and Muttkowski, p. 25, fig. 2 *a*, *b*, and *c*; fig. 3 *a* and *b*.

Of medium size. The suture of the first cephalothoracic segment is rather distinct. The first segment is considerably less in length than the three following. The last cephalothoracic segment is expanded into large lateral processes, each process armed with two spines.

The first segment of the female abdomen equals in length the rest of the abdomen. It is broad, dilated in front, and moderately dilated laterally. It bears prominent lateral processes which are tipped with acute spines directed backward. The second segment is shorter than the third, and the two together are somewhat longer than the furca. The furcal rami are stout and ciliate on both the inner and outer margins.

The antennae are 25-segmented and reach to the furca or to the end of the furca. The antepenultimate segment of the right antenna of the male is unarmed or has a small hyaline lamella, which may be just visible at the distal end of the segment or may extend over the distal third of the segment.

The fifth feet of the female are slender. The spines of the first basal segments are small and acute. The lateral hair of the second

basal segment is of moderate length. The first segment of the exopodite is more than twice as long as wide. The hook is only slightly curved and is finely denticulate on both inner and outer margins. It is armed with three spines, the innermost being the longest. The inner two spines represent the third segment. The endopodite is long and slender, 1-segmented, and exceeds in length the first segment of the exopodite. It is setose at tip, and armed with two long terminal spines which are inserted well back from the end of the endopodite. In the male fifth feet the spines of the first basal segments are rather prominent and acute. The second basal segment of the right foot is twice as long as broad. The lateral hair is situated about at the beginning of the distal third. The first segment of the exopodite is quadrate and bears on the inner distal angle a hyaline process which varies somewhat in size and form; it most commonly has a rounded extremity but may be nearly triangular in form. The second segment is strongly curved and equals in length the first basal segment. The lateral spine is straight or slightly curved, is rather small, and is situated just distad of the middle. The terminal hook is slender, slightly curved, and equal in length to the rest of the foot with the exception of the first basal segment. It is denticulate on the inner margin. The endopodite is small, variable in length, but not as long as the first segment of the exopodite. It is ordinarily pointed at the distal extremity, but in some individuals it is rounded. The left foot reaches to the end of the first segment of the right exopodite. The second basal segment is as long as wide, and strongly convex on the inner margin. The lateral hair is situated near the distal end. The first segment of the exopodite is longer than wide. The second segment is about one-half the length of the first, and the inner surface is a convex setose pad. The segment is terminated with two digitiform processes, of which the outer is the longer. The endopodite is long and slender, reaching to the middle of the second segment of the exopodite. It is either 1-segmented or indistinctly 2-segmented. The tip is distinctly setose.

Length according to Poppe: Female, 1 mm.; male, 1.5 mm.

Length according to Lilljeborg: Female, 1.9 mm.; male, 1.8 mm.

Specimens from Alturas Lake averaged: Female, 1.258 mm.; male, 1.15 mm.

It seems probable that in Poppe's description the lengths for the female and male were transposed.

The original description by Poppe was from material collected at Summit Lake in the Canadian Rockies, at a heighth of 5,300 feet. Lilljeborg's material was from Centerville, California. It has also been found in collections made by the United States Fish Commission in Alturas Lake, Idaho, and in the Pribiloff Islands, Alaska, and by the author in Yellowstone Park and in Lake Tahoe.

The description as given above conforms very closely, as in the diagnosis given, Marsh, 1907, to the descriptions given by Poppe and by Lilljeborg in Guerne and Richard 1889. The changes are in minor additions, which are made in order to conform to the more complete knowledge of the species which is furnished by the recent collections.

In most particulars the species seems to be quite constant in its structural characters. The endopodite of the right fifth foot of the male varies in its form and length, but not within wide limits. The endopodite of the left foot is sometimes 1-segmented and sometimes 2-segmented. The spines of the second segment of the exopodite of the fifth foot of the female are, in the specimens examined by the author, much more prominent than figured by De Guerne and Richard; the innermost spine is particularly long. The variations in the armature of the antepenultimate segment of the right antenna of the male are particularly interesting. In the original description by Poppe this segment was said to be entirely unarmed. In the diagnosis of De Guerne and Richard it is said that it is "plane dearmatus, tantum modo modulo minutissimo et vix visibili praeditus." In the specimens from the Pribiloff Islands there was no armature. In those from Yellowstone Park, as shown in figure 6, there was a small hyaline lamella extending back fully one-third the length of the segment, and projecting appreciably from the distal end. In the specimens from Alturas as shown in figure 7 there is a very minute hyaline lamella at the distal end of the segment, while in the Tahoe material the armature is entirely absent.

FIG. 6.—DIAPTOMUS TYRELLI. TERMINAL SEGMENTS ANTENNA OF MALE FROM YELLOWSTONE PARK, × 445.

FIG. 7.—DIAPTOMUS TYRELLI. TERMINAL SEGMENTS ANTENNA OF MALE FROM ALTURAS LAKE, IDAHO, × 445.

It appears that the Alaskan material most closely resembles the type described by Poppe. It is generally considered that the antennal armature is not subject to variation. If no variability is considered possible, the Yellowstone Park form must certainly be considered a separate species, and possibly the Alturas form another. Considerable interest attaches to just what Lilljeborg had for the description of De Guerne and Richard, the material being collected at "Centerville, near Fresno, California," and it is to be hoped that at some time a reexamination may be made of material collected from that locality.

D. coloradensis was described by Marsh in 1911 from material found in the Rocky Mountains in Colorado; it has since been found in the

Wahsatch Mountains in Utah. This is undoubtedly very close to *tyrelli*. The main points of difference as stated in the original description were as follows:

1. The spines of the first basal segments of the female fifth foot are large in *coloradensis*, small in *tyrelli*.

2. The endopodite of the female fifth foot is shorter than the first segment of the exopodite in *coloradensis*, but longer in *tyrelli*.

3. In the male fifth foot the distal margin of the first segment of the right exopodite has two hyaline processes in *coloradensis*, one in *tyrelli*.

4. The lateral spine of the second segment of the exopodite of the male fifth foot is strongly curved in *coloradensis*, but nearly straight in *tyrelli*.

5. The second segment of the exopodite of the male fifth foot has a blunt spine on the dorsal surface in *coloradensis*, but none in *tyrelli*.

6. The right endopodite of the male fifth foot is nearly as long as the first segment of the exopodite in *coloradensis*, but much shorter in *tyrelli*.

7. The left endopodite of the male fifth foot is much stouter in *coloradensis* than in *tyrelli*.

A careful reexamination of the available material shows that these points hold good except the sixth and that the endopodite of the fifth foot in the female in some specimens equals in length the first segment of the exopodite. To these may be added that the second segment of the right exopodite of the fifth foot of the male in *coloradensis* is nearly straight, while in *tyrelli* it is strongly curved and somewhat shorter and stouter. A minor point may also be mentioned that apparently in *coloradensis* the lateral spine of the second segment of the exopodite of the right fifth foot of the male turns down—that is, toward the distal end of the segment—while in *tyrelli* it turns toward the proximal end of the segment.

The distinctness of *coloradensis* then seems assured, and further study of the related forms may make it best to separate others from *tyrelli*.

D. pribilofensis Juday and Muttkowski, must, without doubt, be considered identical with *D. tyrelli*.

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